IN THE CLAIMS

1. (Currently Amended) A method for the analysis of mixtures containing proteins, said method comprising the steps of:

(a) reducing [[the]] disulfide bonds in the proteins of a sample, thereby providing thiol groups in cysteine-containing proteins;

(b) blocking free thiols with a blocking reagent in the sample;

(c) digesting the proteins in the sample to provide peptides;

(d) ~~reducing the disulfide bonds in~~ deprotecting the ~~digested~~ peptides to remove the blocking reagent, thereby providing thiol groups in cysteine-containing peptides for reaction;

(e) reacting cysteine-containing peptides in the sample with a tagging reagent, wherein said tagging reagent comprises a thiol-specific reactive group which is attached to a polymer tag via a linker, wherein the linker can be differentially labeled with stable isotopes and wherein the polymer tag forms a covalent bond with the cysteine-containing peptides;

(f) washing the ~~polymer-bound peptides~~ polymer tag to remove non-covalently bound species;

(g) eluting the cysteine-containing peptides from the polymer tag; and

(h) subjecting the eluted peptides to quantitative mass spectrometry (MS) analysis.

2. (Currently Amended) The method according to Claim 1, wherein said method further comprises the steps of:

performing steps (a) to (d) on a second sample;

reacting cysteine-containing ~~labels~~ peptides in the second sample with a stable isotope-labeled form of the tagging reagent, wherein in reacting step (e) of Claim 1, the

tagging reagent used is a non-isotope labeled form of the tagging reagent;

mixing the peptides of the reacted sample following step (e) and the reacted second sample; and

performing steps (g) and (h) on the peptides in the mixture.

3. (Currently Amended) The method according to Claim 1, wherein the tagging reagent comprises a thiol-specific reactive group [[is]] selected from the group consisting of α-haloacetyl and maleimide.

4. (Original) The method according to Claim 1, wherein the blocking reagent is methyl methane thiosulfonate.

5-13. (Canceled)

14. (Original) The method according to Claim 1, wherein the eluted peptides are subjected to high-performance liquid chromatography-mass spectrometry (MS) analysis, two-dimensional liquid chromatography MS, or MS/MS analysis.

15. (Original) The method according to Claim 1, wherein the proteins are digested using tryspin.

16. (Currently Amended) A compound useful for capturing cysteine-containing peptides, ~~which is selected from the group consisting of~~ comprising a thiol-specific reactive group attached to a non-biological polymer via a linker, wherein said compound forms a non-disulfide, covalent bond with a thiol group on said cysteine-containing peptides.

17. (Original) The compound according to Claim 16, wherein the linker contains a substitution of at least six atoms with a stable isotope.

18. (Original) The compound according to Claim 16, wherein the linker contains ten stable isotopes.

19. (Original) The compound according to Claim 17, wherein the stable isotope is

deuterium.

20. (Canceled)

21. (Currently Amended) A reagent kit for the analysis of proteins by mass ~~spectral~~ spectrometry analysis ~~that comprises a~~ , said kit comprising the compound of Claim 16.

22. (Currently Amended) The reagent kit of Claim 21 which comprises a set of ~~substantially identical differentially labeled cysteine-tagging reagents~~ compounds of Claim 16, said set of compounds are differentially labeled with stable isotopes.

23. (Currently Amended) The reagent kit of Claim 22, further comprising one or more proteolytic enzymes for use in digestion of proteins to be analyzed.

24. (New) A method for the analysis of mixtures containing proteins, said method comprising the steps of:

(a) reducing disulfide bonds in the proteins of a sample, thereby providing thiol groups in cysteine-containing proteins;

(b) blocking free thiols with a blocking reagent in the sample;

(c) digesting the proteins in the sample to provide peptides;

(d) deprotecting the peptides to remove the blocking agent, thereby providing thiol groups in cysteine-containing peptides for reaction;

(e) reacting cysteine-containing peptides in the sample with a tagging reagent, wherein said tagging reagent has the formula:

A1 - linker - A2 - polymer

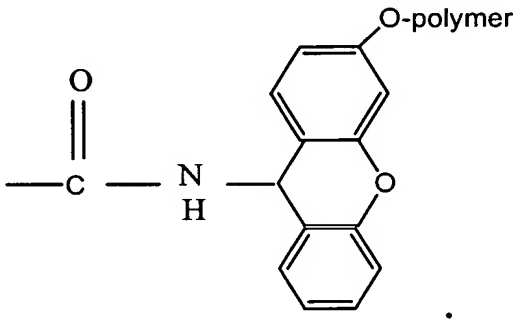
wherein A1 is a thiol-specific reactive group, A2 is an acid labile group to which a polymer is bound, the linker can be differentially labeled with stable isotopes, and the polymer forms a covalent bond with the cysteine-containing peptides;

(f) washing the polymer tag to remove non-covalently bound species;

(g) eluting the cysteine-containing peptides from the polymer tag; and

(h) subjecting the eluted peptides to quantitative mass spectrometry (MS) analysis.

25. (New) The method according to Claim 24, wherein the acid-labile group bound to the polymer has the structure:



26. (New) The method according to Claim 24, wherein the polymer in the tagging reagent is a polymer resin.

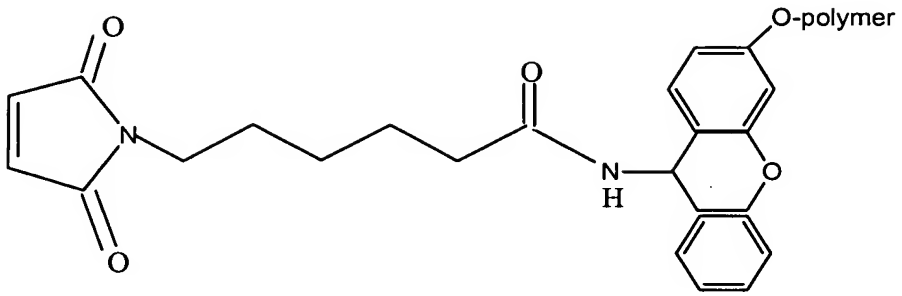
27. (New) The method according to Claim 26, wherein the polymer resin is a homopolymer or heteropolymer comprising a polymer selected from the group consisting of polystyrene and polyethylene glycol.

28. (New) The method according to Claim 27, wherein the linker contains a substitution of at least six hydrogen atoms with a stable isotope.

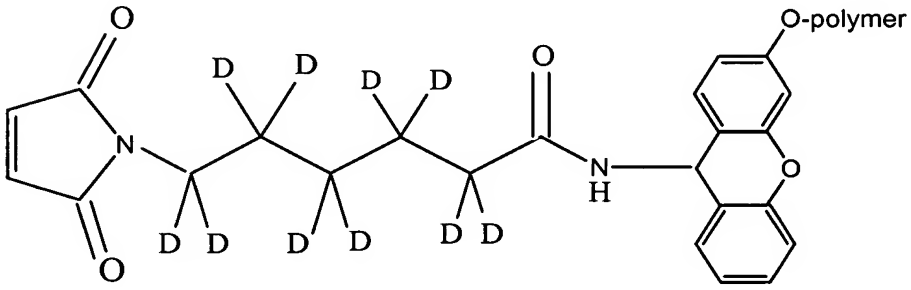
29. (New) The method according to Claim 28, wherein the linker contains ten stable isotopes.

30. (New) The method according to Claim 28, wherein the stable isotope is deuterium.

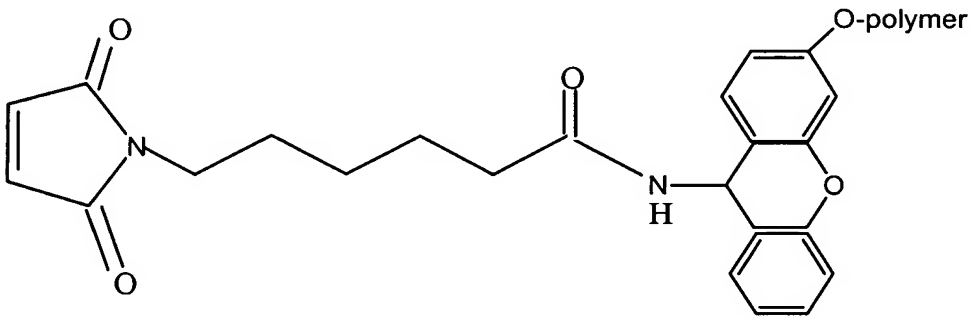
31. (New) The method according to Claim 24, wherein the tagging reagent has the formula:



32. (New) The method according to Claim 24, wherein the tagging reagent has the formula:



33. (New) A compound useful for capturing cysteine-containing peptides, said compound being selected from the group consisting of:



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